

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,845,175 B2
APPLICATION NO. : 09/830264
DATED : January 18, 2005
INVENTOR(S) : Avi Kopeloman et al.

Page 1 of 11

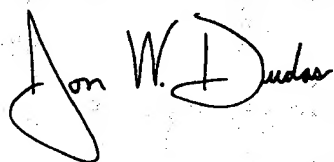
It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Delete the title page and substitute therefore the attached title page.

Delete Drawing Sheets 1-11 and substitute therefore the attached Drawing Sheets 1-9.

Signed and Sealed this

Twenty-first Day of August, 2007

A handwritten signature in black ink, reading "Jon W. Dudas", is written over a faint, rectangular, textured background.

JON W. DUDAS
Director of the United States Patent and Trademark Office

(12) **United States Patent**
Kopelman et al.

(10) Patent No.: **US 6,845,175 B2**
(45) Date of Patent: **Jan. 18, 2005**

(54) **DENTAL IMAGE PROCESSING METHOD AND SYSTEM**

(75) Inventors: Avi Kopelman, 'Iel Aviv (IL); Eldad Taub, Reut (IL)

(73) Assignee: Cudent Ltd., Or Yehuda (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 479 days.

(21) Appl. No.: 09/830,264

(22) Filed: Apr. 23, 2001

(65) Prior Publication Data
US 2003/0169913 A1 Sep. 11, 2003

Related U.S. Application Data

(63) Continuation of application No. PCT/IL99/00577, filed on Nov. 1, 1999.

(30) Foreign Application Priority Data

Nov. 1, 1998 (IL) 126838

(51) Int. Cl.⁷ G06K 9/00

(52) U.S. Cl. 382/154; 382/294; 128/922

(58) Field of Search 382/128, 131,
382/154, 285, 294; 600/587, 589, 590;
128/922; 433/24, 29, 68, 69, 215

(56) References Cited

U.S. PATENT DOCUMENTS

5,151,856 A 9/1992 Halmana et al.

5,278,756 A 1/1994 Lemchen et al.
5,318,441 A * 6/1994 Keller 433/68
6,068,482 A * 5/2000 Snow 433/223
6,081,739 A * 6/2000 Leachon 600/407

FOREIGN PATENT DOCUMENTS

DE 4141311 8/1993
EP 0488987 6/1992
EP 0741994 11/1996
JP 4-336048 11/1992
WO WO 97/03622 2/1997
WO 01/80761 A2 11/2001

OTHER PUBLICATIONS

International Search Report for International Application No. PCT/IL 99/00577, mailed on Feb. 17, 2000.
An English language title and abstract is provided for DE 4141311.

* cited by examiner

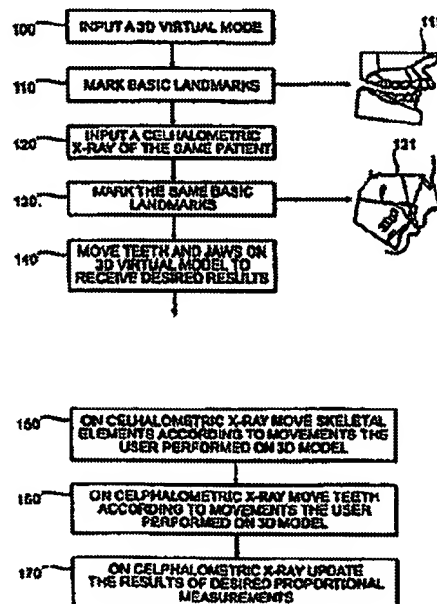
Primary Examiner—Todd E. Manahan

(74) Attorney, Agent, or Firm—Nath & Associates PLLC;
Gary M. Nath; Lee C. Heiman

(57) **ABSTRACT**

An image processing method for use in dentistry or orthodontic is provided. Two images of teeth, one being a two-dimensional image and one a three-dimensional image are combined in a manner to allow the use of information obtained from one to the other. In order to combine the two images a set of basic landmarks is defined in one, identified in the other and then the two images are registered.

23 Claims, 9 Drawing Sheets



U.S. Patent

Jan. 18, 2005

Sheet 1 of 9

6,845,175 B2

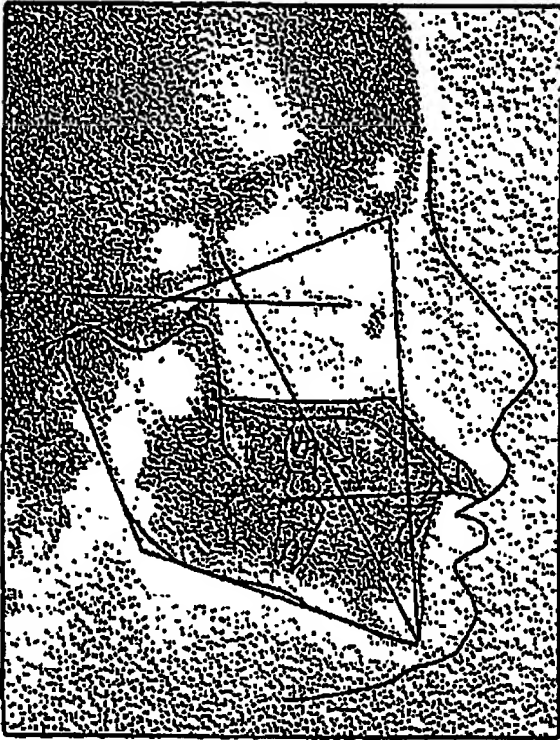


FIG. 1A

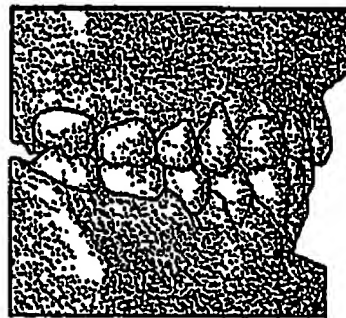


FIG. 1B
PRIOR ART

U.S. Patent

Jan. 18, 2005

Sheet 2 of 9

6,845,175 B2

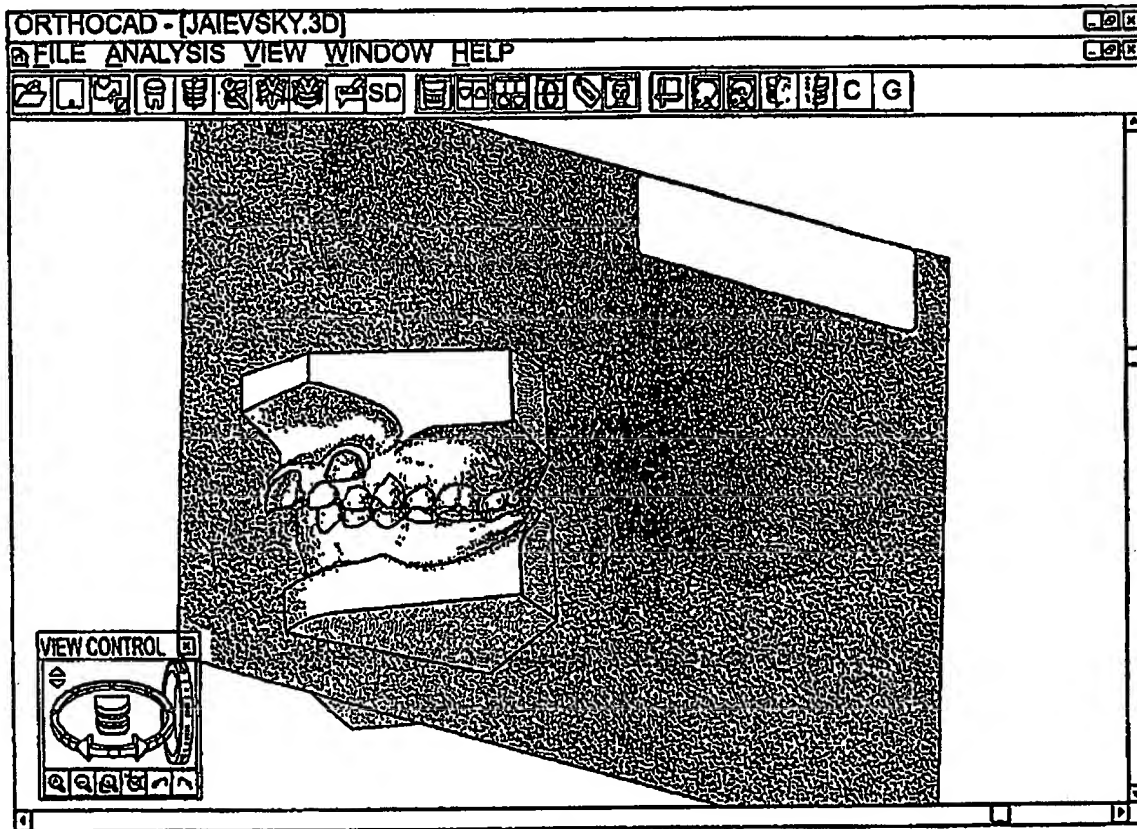
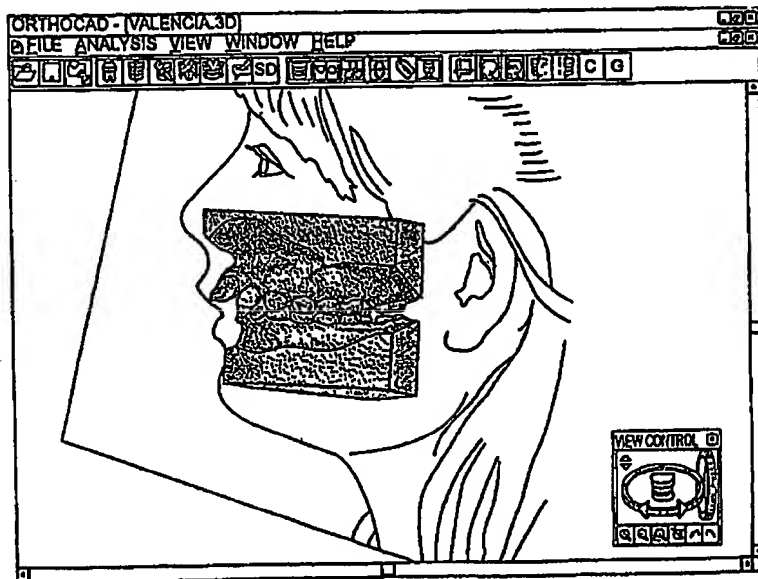
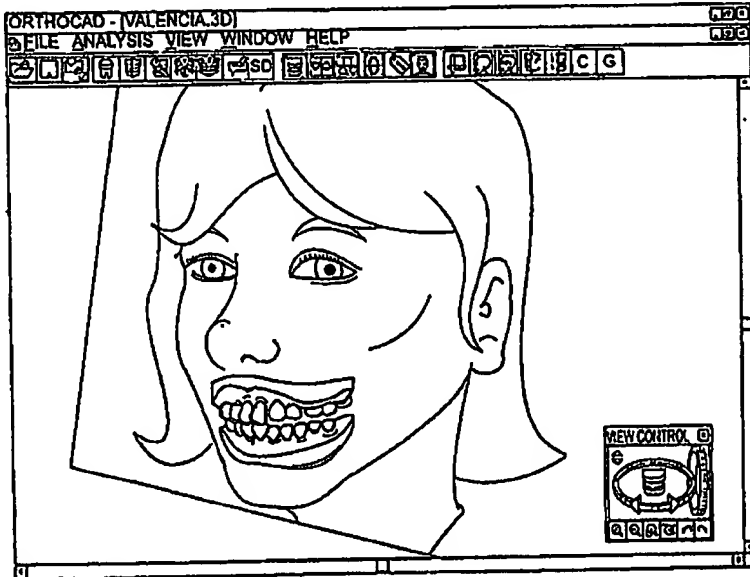


FIG. 2



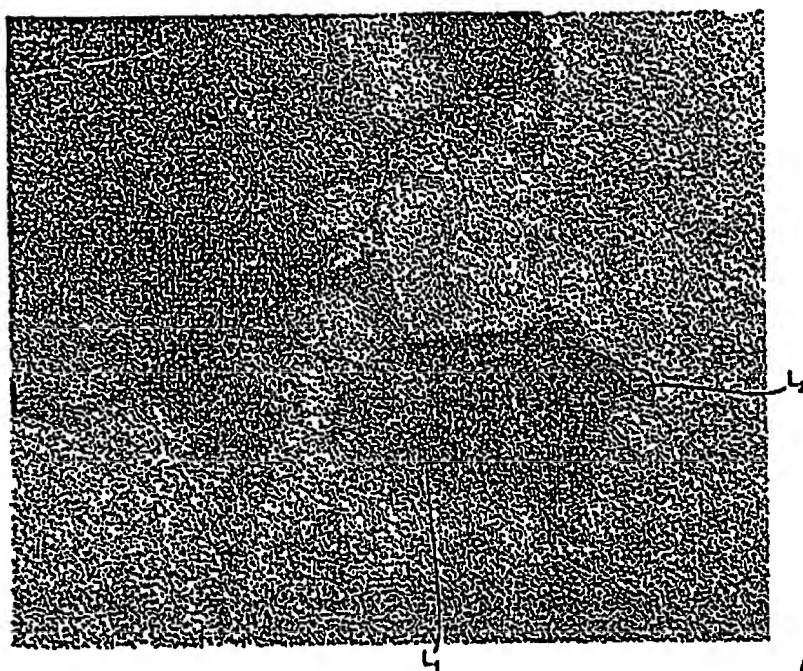


FIG. 4A

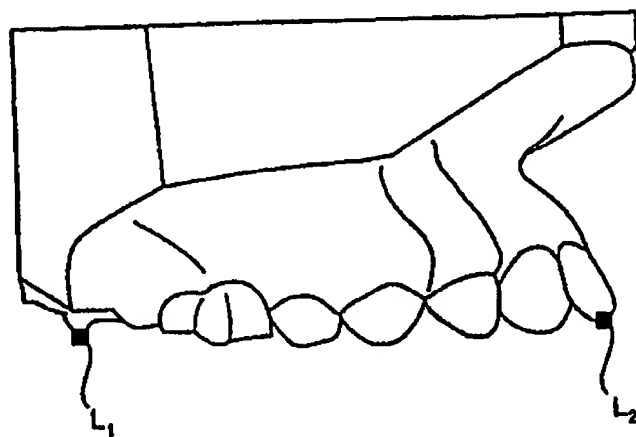


FIG. 4B

U.S. Patent

Jan. 18, 2005

Sheet 5 of 9

6,845,175 B2

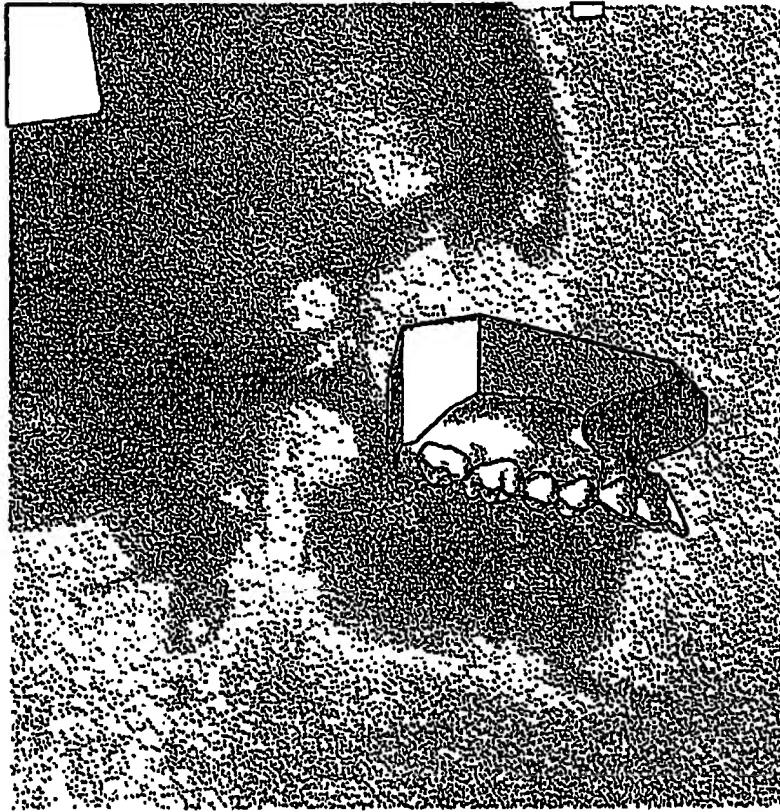


FIG. 5

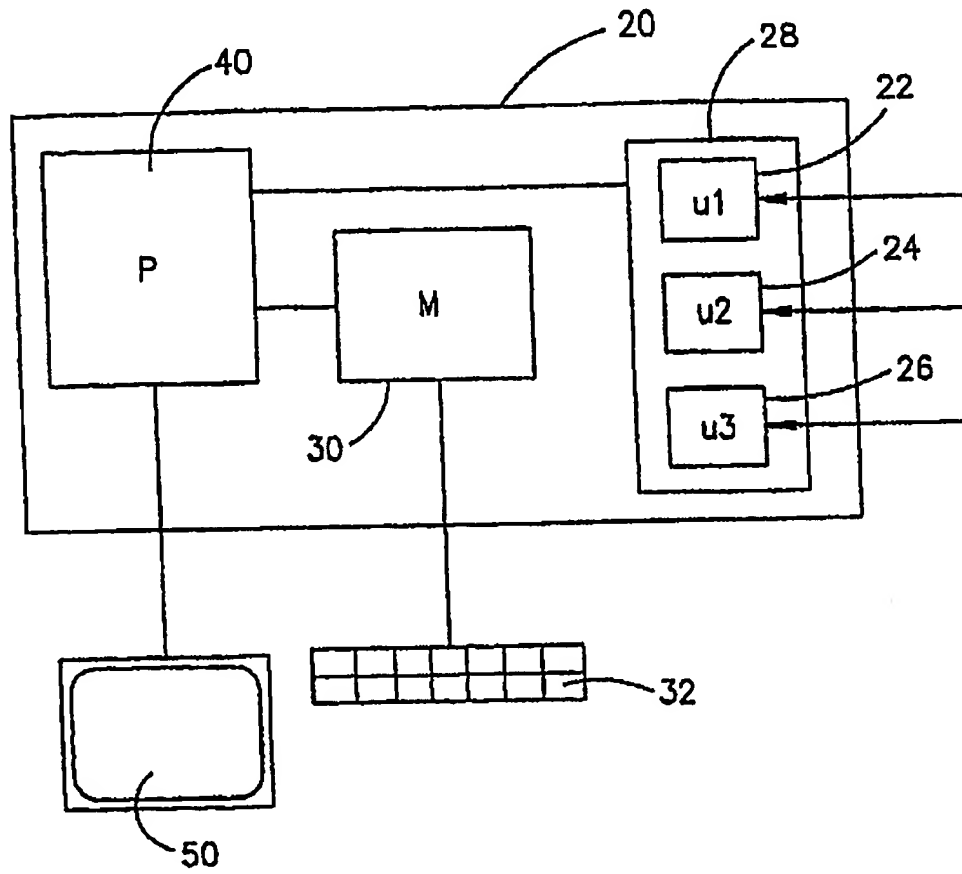
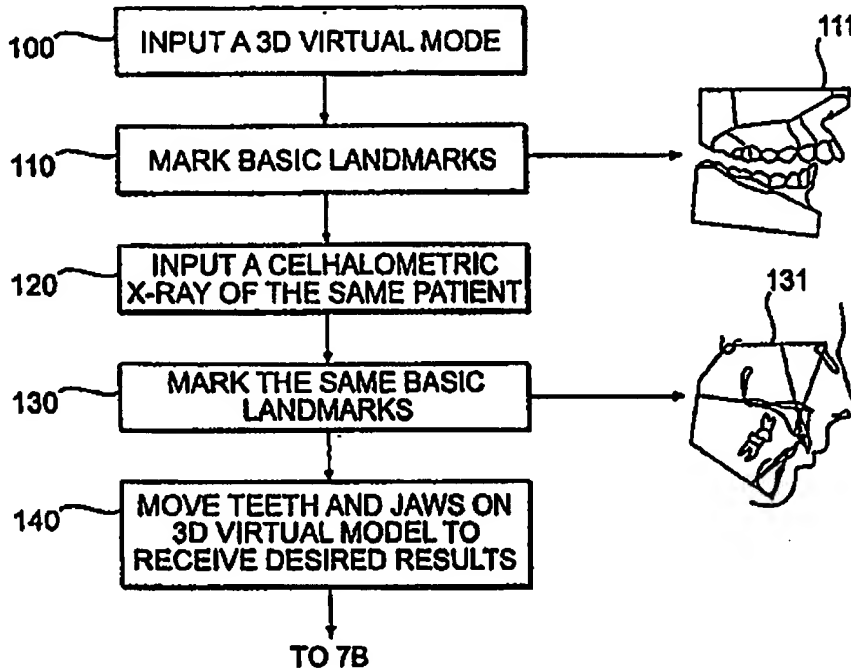
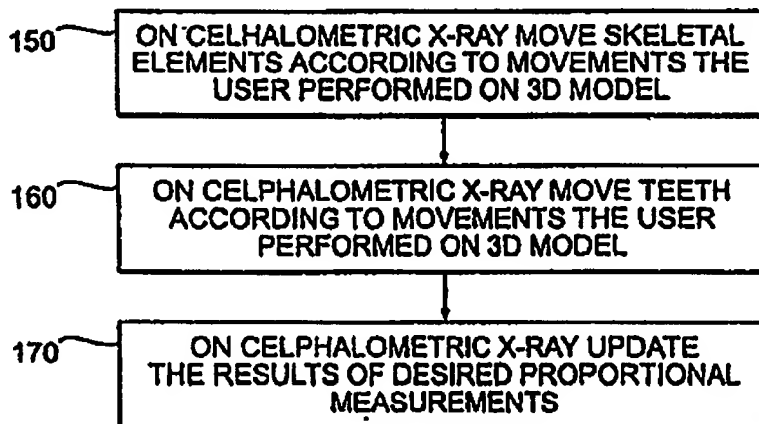
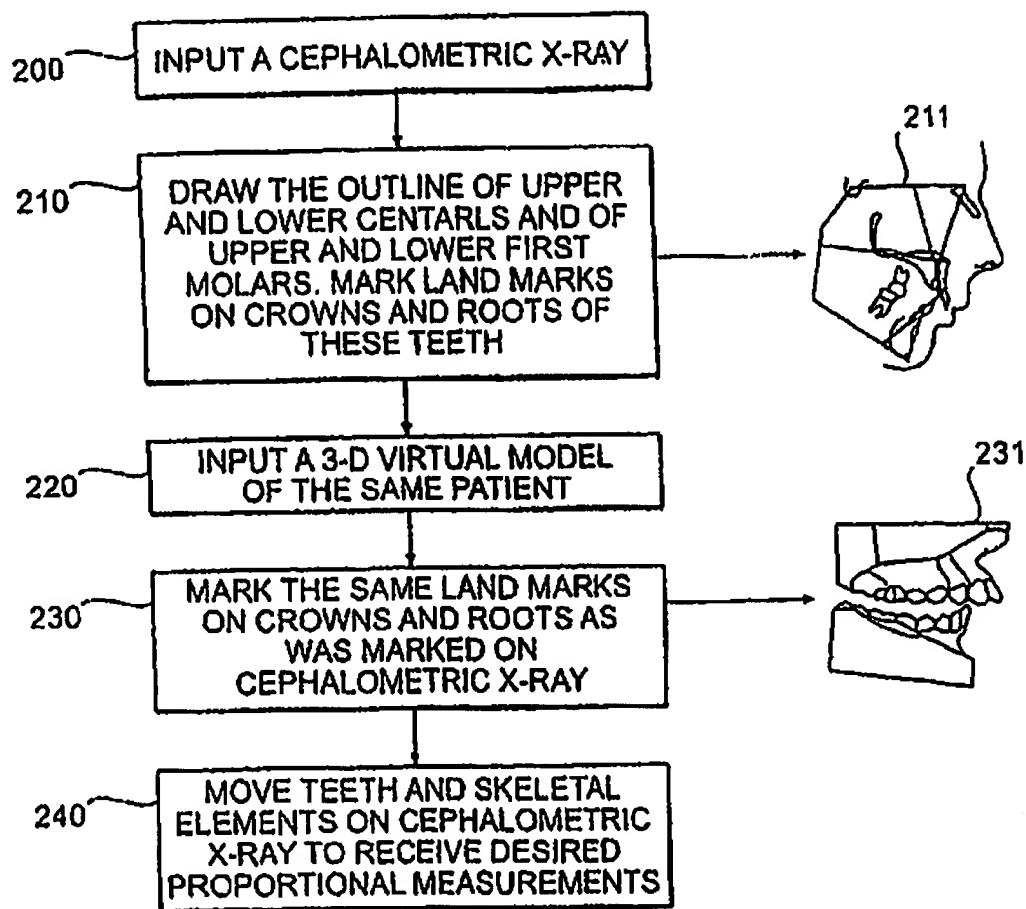


FIG. 6

**FIG. 7A****FIG. 7B**

**FIG. 8A**

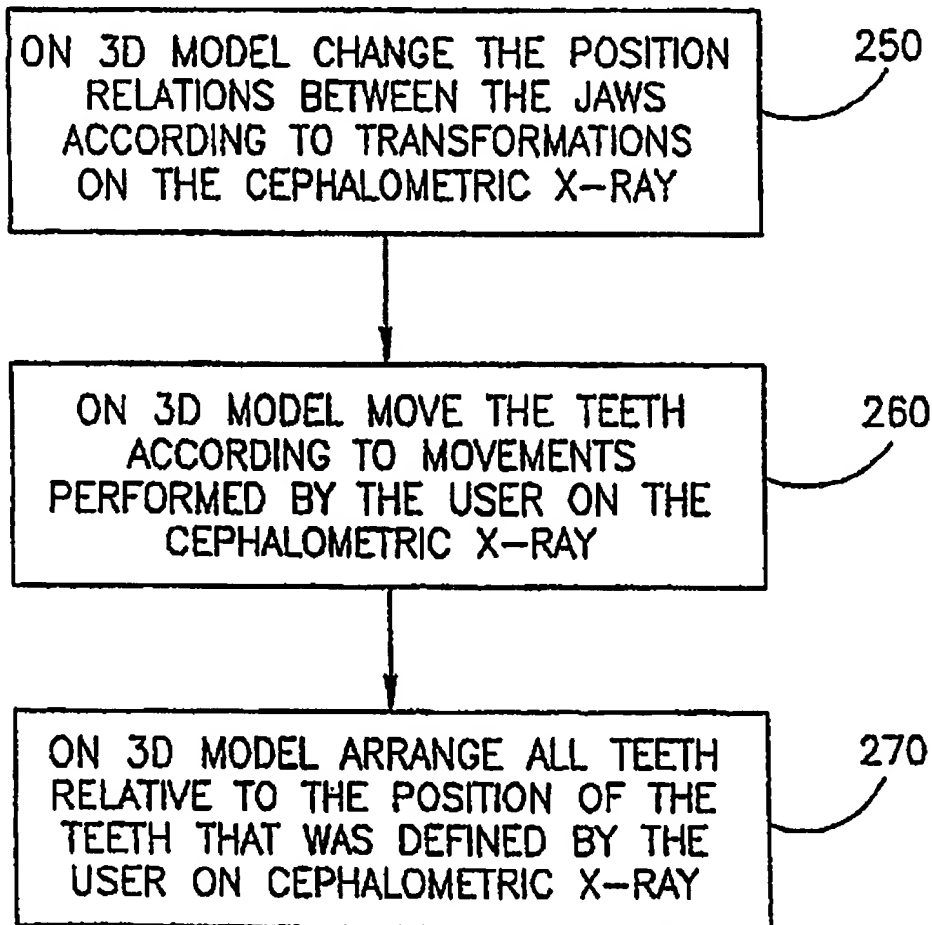


FIG.8B